COLLEGE OF MEDICINE

32

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Subject: Community medicine

Lecture: Nosocomial infection

اللي عليه العلامة هذي ركزت عليه الدكتورة
بالتوفيق يارب💙

Nosocomial Infections
Hospital-acquired infection or HAI,

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What is Nosocomial Infection?

It is a localized or systemic infection that is acquired in the hospital by a hospitalized patient

&

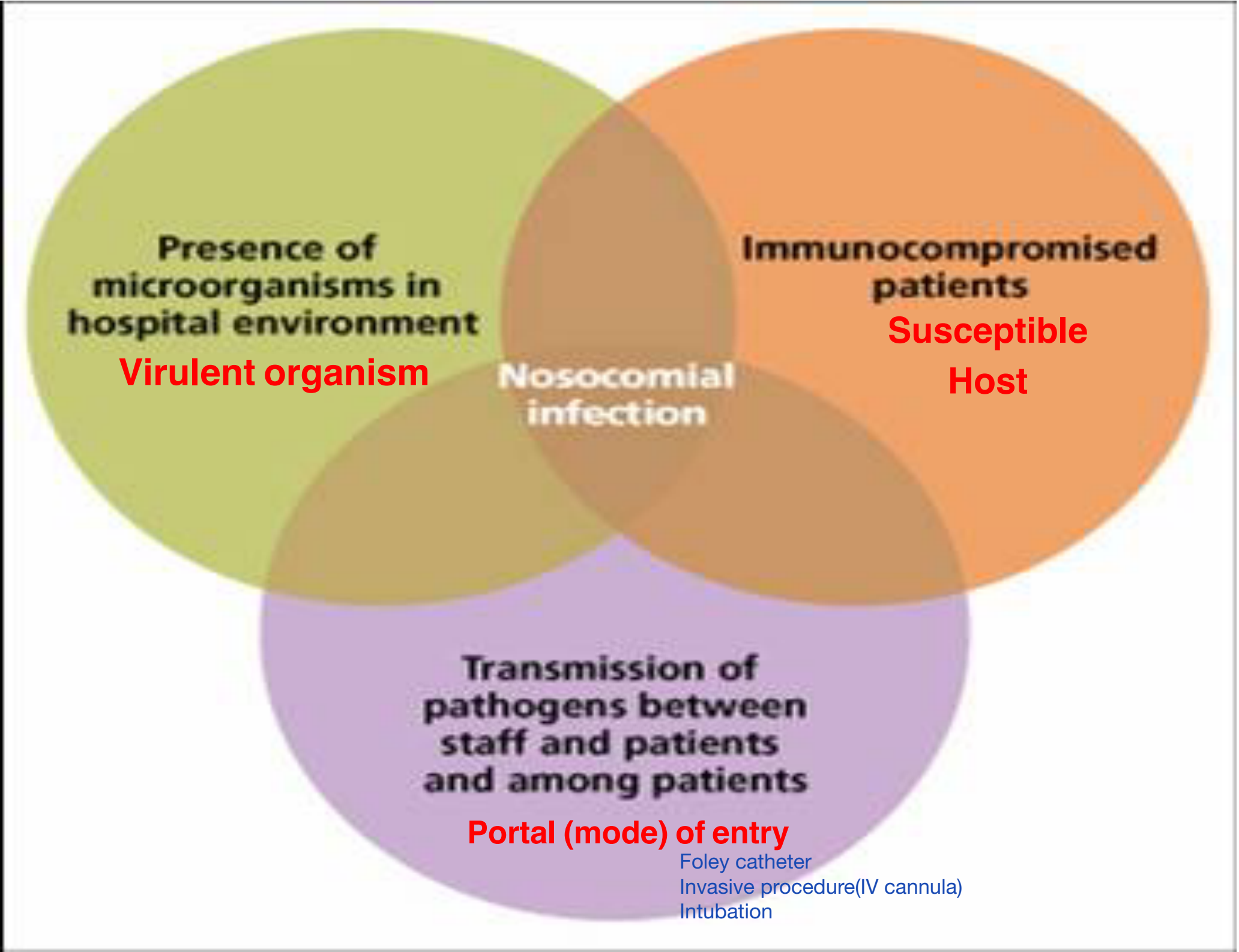
It is not present or incubating at the time of admission

5-10% of patients admitted to acute care hospitals acquire infections

Difficult to treat them,because of frequent sterilization in the hospital the organism that present in normal environment become resistance to normal medication

- **2 million patients/year**
- **¼ of Nosocomial infections occur in ICUs** survive will decrease
- **90,000 deaths/year**
- ***The overall nosocomial infection rate was 5% of patients admitted in a study from Military Hospital; KSA***
- **Attributable annual cost: $4.5 – $5.7 billion**

Just for nosocomial infection


Presence of microorganisms in hospital environment
Virulent organism
Immunocompromised patients
Susceptible Host
Nosocomial infection
Transmission of pathogens between staff and patients and among patients
Portal (mode) of entry
Foley catheter
Invasive procedure(IV cannula)
Intubation

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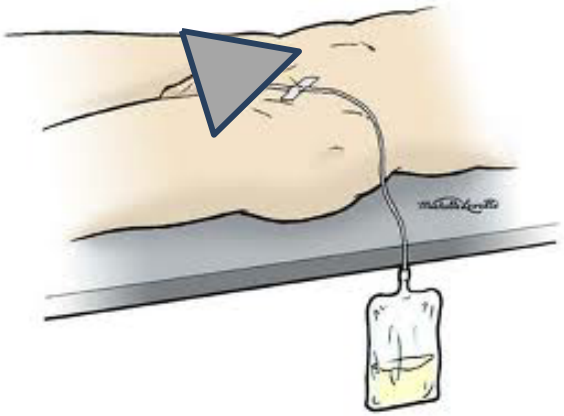
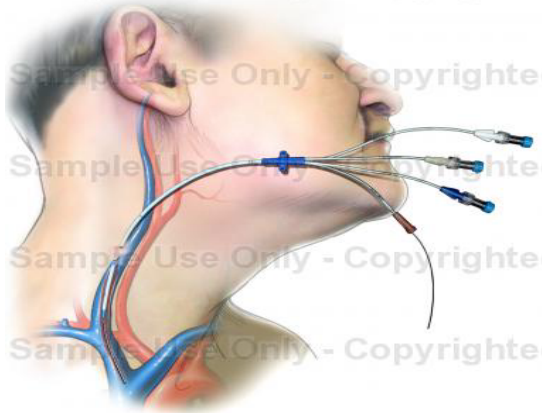
PATHOGENESIS OF NOSOCOMIAL INFECTIONS

- Host defenses depressed by underlying disease or treatment, malnutrition, age
- Anatomic barriers breached (IV's, foleys, vents etc.)
- Exposure to virulent pathogens
  - many resistant to multiple antibiotics





Sample Use Only - Copyrighte

Where do the microbes come from?

1. **Patient's own flora** — It's already present inside the body (skin,nose,urinary tract)then when the immunity is decrease , they can get infection anywhere
2. **Cross infection from medical personnel** — فحصت شخص وفتحت الباب وهو قد انفتح من شخص كان حامل العدوى بيده وجيت فحصت احد ثاني كذا ممكن انقل العدوى له
3. **Cross infection from patient to patient**
4. **Hospital environment-inanimate objects**

- Air
- Dust
- IV fluids & catheters
- Washbowls
- Bedpans
- Endoscopes
- Ventilators & respiratory equipment

Suction tube also

X represents VRE culture positive sites

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Source of Infection

- **Reactivation of latent infection: TB, herpes viruses**
  - **Less common**
- **Endogenous: normal commensals of the skin, respiratory, GI, GU tract; about**
  - **Common**
- **Exogenous**
  - **Inanimate environment: *Aspergillus* from hospital construction, *Legionella* from contaminated water**
  - **Animate environment: hospital staff, visitors, other patients**
    - ***Cross transmission- common***

B.c of exogenous spreed

Mode of Transmission

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- **Contact**: direct (person-person), indirect (transmission through an intermediate object-- contaminated instruments
- **Airborne:** organisms that have a true airborne phase as pattern of dissemination (TB, Varicella)
- **Common-vehicle:** common animate vehicle as agent of transmission ***(ingested food or water, blood products, IV fluids)***
- **Droplet:** brief passage through the air when the source and patient are in close proximity
- **Arthropod**: like flies, bed bugs and mosquitoes

Sites of Nosocomial Infections

Urinary tract 40%

M.C (foley catheter)

Pneumonia 20%

-B.c if the patient not change his position the sputum that contain normal flora can infect the person

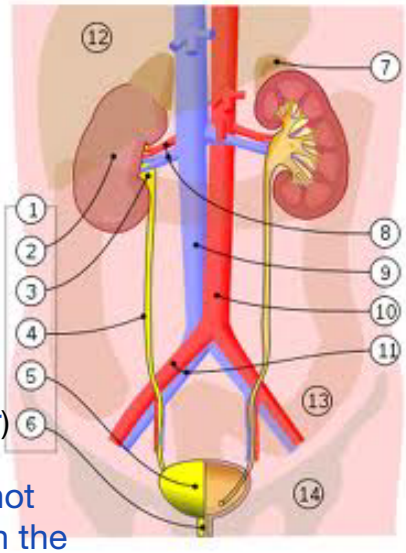
-Intubation tube

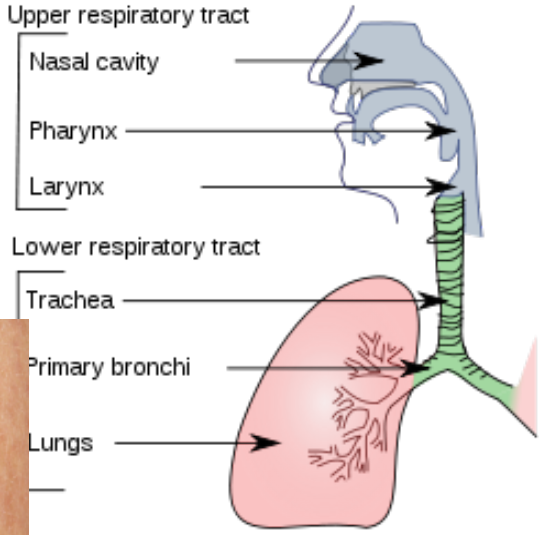
Surgical site 17%

Bloodstream (IV) 8%

We have to change the cannula every 4-5 dayes

In OR,if you don't care about (Bandages and wound care)





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Nosocomial Pneumonia

- Lower respiratory tract infection
- Develops during hospitalization
- Not present or incubating at time of admission
- Does not become manifest in the first 48-72 hours of admission

Risk factors

- Endotracheal intubation
- ICU
- Antibiotics
- Surgery
- Chronic lung disease
- Advanced age
- Immunosuppression

Respiratory tract Infection

Early onset (first 3-4 days of mechanical ventilation)

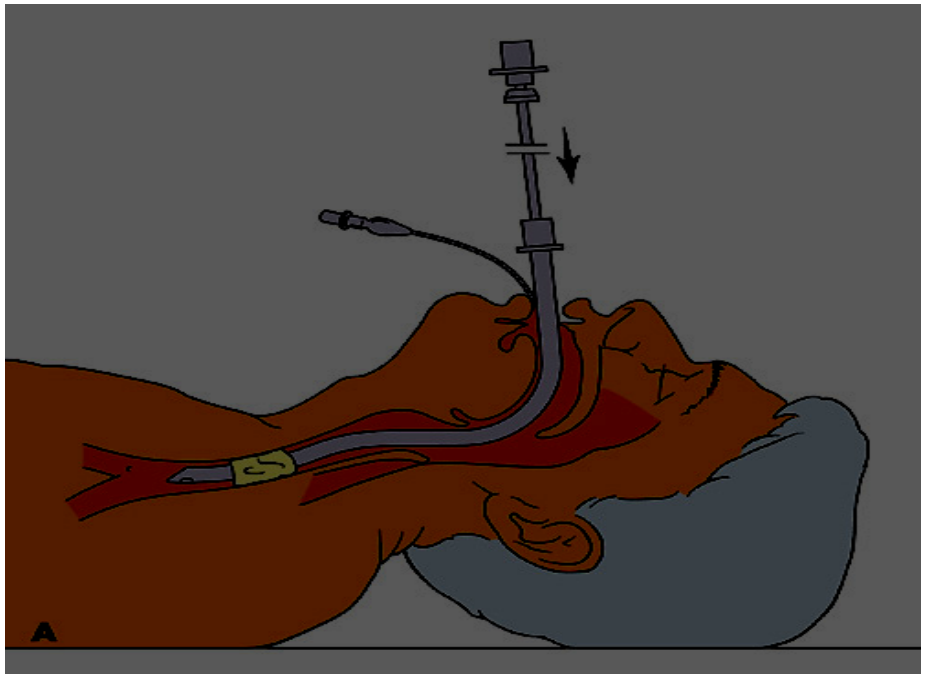
Antibiotic sensitive, community organisms (*S. pneumoniae*, *H. influenzae*, *S. aureus*)

What are the organism that responsible for pneumonia in early hospitalisation?

Late onset

Antibiotic resistant, nosocomial organisms (MRSA, *Ps. aeruginosa*, *Acinetobacter* spp, *Enterobacter* spp)

Organisms for Nosocomial Infections



Organisms for Nosocomial Infections

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Urinary Tract Infections
E. coli
Proteus species
Enterococcus
Klebsiella
Pseudomonas

Surgical Wound Infection	
S. aureus	Present in skin already
Enterococci	
Coag - Staph	
E. coli	
P. aeruginosa	

Nosocomial Bloodstream Infections

Organisms for Nosocomial Infections

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Just remember the most commonest and least commonest no need to remember numbers

N= 20,978

Rank	Pathogen	Percent
1	Coagulase-negative Staph Highest	31.3%
2	S. aureus Second	20.2%
3	Enterococci	9.4%
4	Candida spp	9.0%
5	E. coli	5.6%
6	Klebsiella spp	4.8%
7	Pseudomonas aeruginosa	4.3%
8	Enterobacter spp	3.9%
9	Serratia spp	1.7%
10	Acinetobacter spp Lowest	1.3%

Edmond M. SCOPE Project.

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Reservoirs Of Infection

- **Personnel**
  * hands
  * other skin (scalp)
  * nares- associated with S.aureus colonization
- **Patient**
  * most important source
  * normal flora of skin, mucosal surfaces
- **Environment**
  *contaminated antiseptics, dressings, instruments

How to Prevent & control Nosocomial Infections?

Essential Components of Effective Control

1. **Conducting organized surveillance**

What is surveillance?
Watching over from the top
(infection control team in hospital)

2. **Controlled activities**

like befor going to OR
We have to wear the shoes cover
Wash hand …
Also in ICU
Wound dressing early in day

3. **Having a trained, effectual infection control physician**

4. **An infection control nurse per 250 beds**

5. **A system for reporting infection rates to practicing surgeons** Which doctor can transmit infection to patient?

1. Surveillance

Important means of monitoring nosocomial infections is; Early detection of trends outbreak

1. Laboratory Based

Microbiology Laboratory lists presence of organisms
NIS (nosocomial infections surveillance team) reviews ‘Alert organisms’ reported

Blood culture sample

2. Ward Based

Ward staff monitor patients
NIS reviews
NIS visits wards & reports

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2. Controlled Activities

General Principles

1. **Educational programs and instruction.** Like hand washing technique
2. **Good General Ward Hygiene:**
   - No overcrowding
   - Good ventilation
   - Regular removal of dust
   - Wound dressing early in day
   - Disposable equipment
   - Manage food and water sources in hospitals and clinics
3. **Exposure Reduction**
   - Hand washing ?
   - Aseptic technique during patient care
   - Isolation of patients known or suspected of harboring infectious diseases

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Must wear gloves when touching:

- Blood
- All body fluids
- Nonintact skin
- Mucous membranes

Gowns

- Protect skin and soiling of clothing
- Wear during activities likely to generate splashes or sprays

Sharps

- Avoid recapping of needles
- Avoid removing needles from syringes by hand
- Place used sharps in puncture –resistant containers

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Masks, eye protection, face shield:

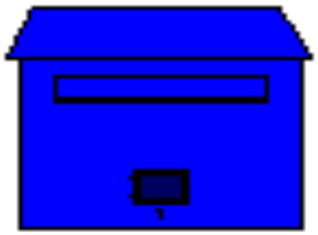
- Wear during activities likely to generate splashes or sprays
- Orange ‘duckbill’ mask required to enter room of patient with infection &
  Door for the room should be kept closed

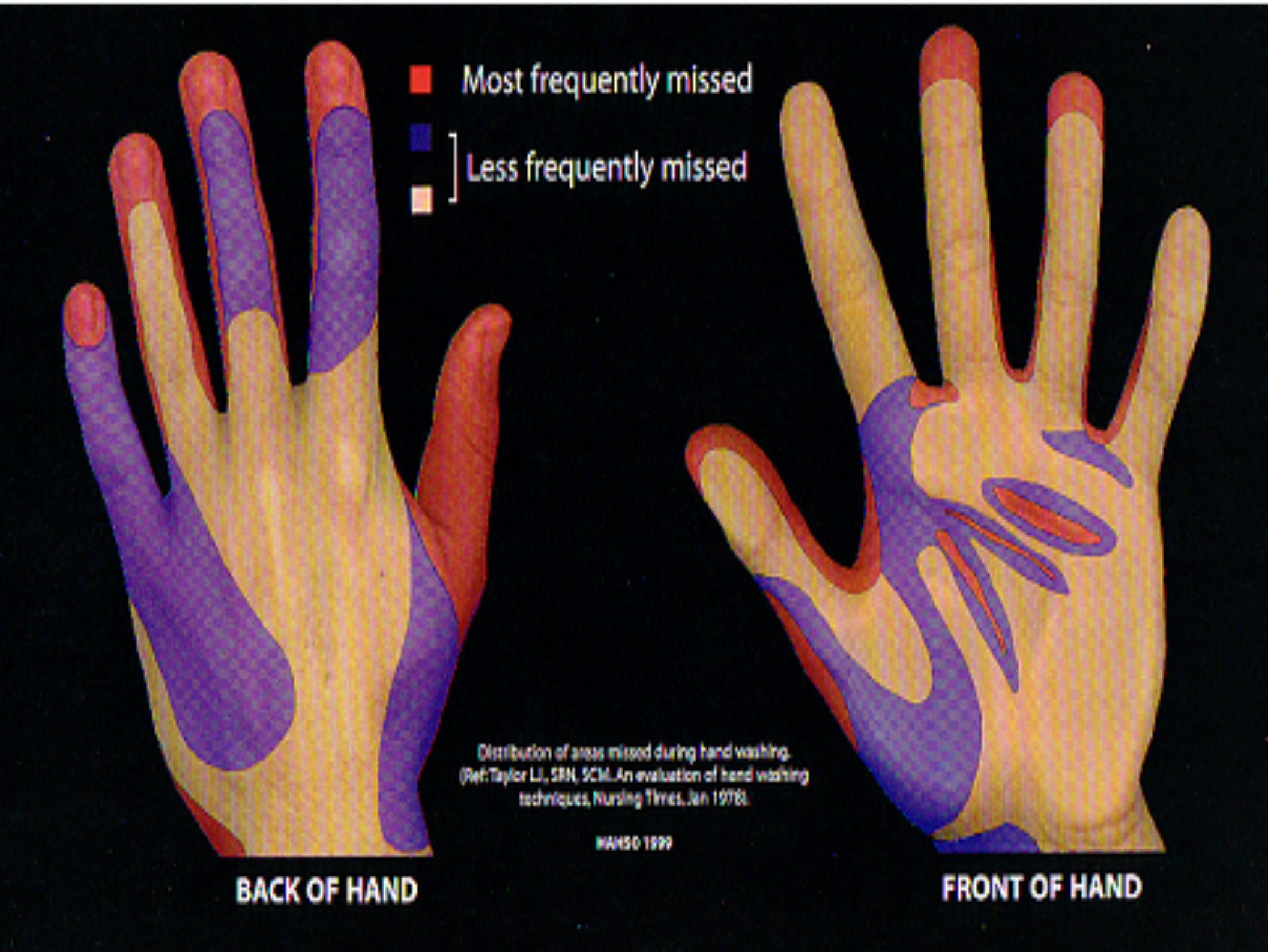
Gowns, gloves for patient contact

Hand hygiene is the simplest, most effective measure for preventing hospital-acquired infections

Remember: everything you touch has been touched by someone else

Thanks for washing your hands





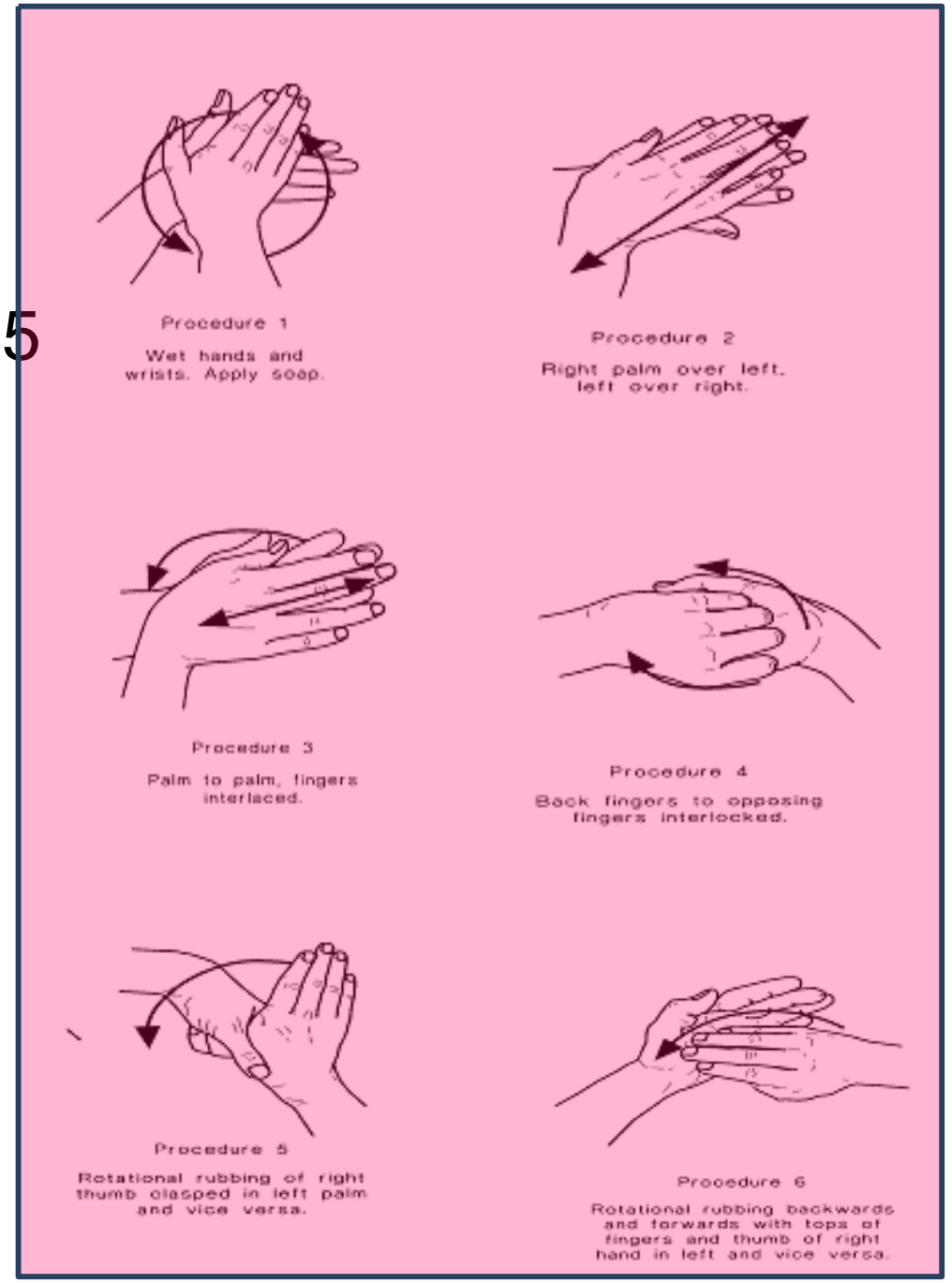
Distribution of areas missed during hand washing.
(Ref: Taylor LJ., SRN, SCM. An evaluation of hand washing techniques, Nursing Times. Jan 1978).

HANSO 1999

Hand Hygiene Techniques

1. Alcohol hand rub
2. Routine hand wash 10-15 seconds
3. Aseptic procedures 1 minute
4. Surgical wash 3-5 minutes

We have to wash the tap as well


Procedure 1
Wet hands and wrists. Apply soap.
Procedure 2
Right palm over left, left over right.
Procedure 3
Palm to palm, fingers interlaced.
Procedure 4
Back fingers to opposing fingers interlocked.
Procedure 5
Rotational rubbing of right thumb clasped in left palm and vice versa.
Procedure 6
Rotational rubbing backwards and forwards with tops of fingers and thumb of right hand in left and vice versa.

Specific Measures

Prevention of Nosocomial Urinary Tract Infections

- Avoid catheter when possible; ***MOST IMPORTANT***
- **Aseptic insertion by trained Health care worker**
- **Maintain closed system of drainage**
- **Ensure dependent drainage**
- **Minimize manipulation of the system**

ما احط له الكاثتير وهو ما يحتاج نفس الشيء لو كنت اقدر اعطيه الدواء oral افضل من اني اعطيه IV عشان اقلل الرسك

Prevention of Nosocomial Pneumonia

- Change position every 2 hours
  - sputum don't stick so less chance to get infection
  - —Elevate head to 30-45 degrees
- Deep breathing,
  - To prevernt Lung function capacity decrease
- Frequent suctioning
- Bronchoscopy to remove mucous plugging

Surgical Wound Infection Prevention

- Limit pre-op hospitalization
- Stabilize underlying diseases
- Skin decolonization

Patient with frequant infection

  - Chlorhexidine
  - Intranasal Mupirocin for *S.aureus* carriers
- Impermeable drapes
  - Maximum sterile barrier precautions
- Improving safety in operating rooms and other high-risk areas

Prevention of Nosocomial Blood Stream Infections

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- **Limit duration of use of intravascular catheters**
  - No advantage to changing catheters routinely
- **Maximal barrier precautions for insertion**
  - Sterile gloves, gown, mask, cap, full-size drape
  - Moderately strong supporting evidence
- **Chlorhexidine prep for catheter insertion**
  - Significantly decreases catheter colonization; less clear evidence for BSI
  - Disadvantages: possibility of skin sensitivity to chlorhexidine, potential for chlorhexidine resistance

- Avoid unsafe and frequently unnecessary injections
- Needle, syringe or both should not be reused

التجميعات

G31:

29. What is the most common type of nosocomial (hospital-acquired) infection?

a) Urinary tract infection (UTI)

Answer: a

26- Women had cholecystectomy and discharged at 27 November , developed pneumonia at 29 November, which type of infections she developed? الأوقات كانت كذا بالضبط

A) nosocomial infection
B) Community acquired

Thank
You